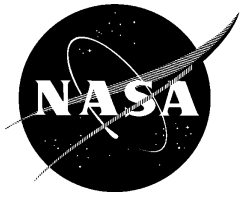
Payload Integration Agreement Increment Addendum Blank Book for Pressurized Payloads

International Space Station Program

Baseline

August 2001

National Aeronautics and Space Administration
International Space Station Program
Johnson Space Center
Houston, Texas



REVISION AND HISTORY PAGE

REV.	DESCRIPTION	PUB. DATE
-	Initial Release (Reference per SSCD 005669, EFF. 09-19-01)	10-04-01

SSP 57060
Baseline

INTERNATIONAL SPACE STATION PROGRAM

PAYLOAD INTEGRATION AGREEMENT INCREMENT ADDENDUM BLANK BOOK FOR PRESSURIZED PAYLOADS

CHANGE SHEET

October 4, 2001

Baseline

Space Station Control Board Directive 005669/(1-1), dated 09-19-01. (1)

CHANGE INSTRUCTIONS

SSP 57060, Payload Integration Agreement Increment Addendum Blank Book for Pressurized Payloads, has been baselined by the authority of SSCD 005669. All future updates to this document will be identified on this change sheet.

INTERNATIONAL SPACE STATION PROGRAM

PAYLOAD INTEGRATION AGREEMENT INCREMENT ADDENDUM BLANK BOOK FOR PRESSURIZED PAYLOADS

*Baseline (Reference SSCD 005669, dated 09-19-01)

LIST OF EFFECTIVE PAGES

October 4, 2001

The current status of all pages in this document is as shown below:

Page	Change No.	SSCD No.	Date
i - xiv	Baseline	005669	09-19-01
1-1 - 1-2	Baseline	005669	09-19-01
2-1 - 2-2	Baseline	005669	09-19-01
3-1 - 3-4	Baseline	005669	09-19-01
4-1 - 4-8	Baseline	005669	09-19-01
5-1 - 5-10	Baseline	005669	09-19-01
6-1 - 6-6	Baseline	005669	09-19-01
7-1 - 7-2	Baseline	005669	09-19-01
8-1 - 8-3	Baseline	005669	09-19-01
A-1 - A-4	Baseline	005669	09-19-01
B-1 - B-2	Baseline	005669	09-19-01
C-1 - C-2	Baseline	005669	09-19-01

SSP 57060
Baseline

INTERNATIONAL SPACE STATION PROGRAM

PAYLOAD INTEGRATION AGREEMENT INCREMENT ADDENDUM BLANK BOOK FOR PRESSURIZED PAYLOADS

AUGUST 2001

FOREWARD

PAYLOAD INTEGRATION AGREEMENT INCREMENT ADDENDUM BLANK BOOK FOR PRESSURIZED PAYLOADS

This document, SSP 57060, Payload Integration Agreement Increment Addendum Blank Book for Pressurized Payloads, contains the standard format that will be used by International Space Station (ISS) Program Participants to develop a unique payload Increment Addendum for ISS pressurized payloads. The Research Program Office (RPO), Payload Developer (PD), or Appropriate Office and the Payload Integration Manager (PIM) will use this blank book for the development of the unique Payload Integration Agreement (PIA) Increment Addendum. Use of the standard format will provide a consistent definition of the required integration agreements for the payload organization and the ISS Program.

The development of the unique payload PIA Increment Addendum shall be in compliance with the signed payload-unique PIA between the RPO, PD, Appropriate Office and the ISS Program Payloads Office as derived from SSP 57059, Standard Payload Integration Agreement for Pressurized Payloads.

This PIA Increment Addendum Blank Book is consistent with the processes and products to be prepared by the ISS Program Participants, as specified in SSP 50200-01, Station Program Implementation Plan, Volume 1: Station Program Management Plan. This document is under the Configuration Management (CM) control of the ISS Program Payloads Control Board (PCB), and any changes or revisions will be reviewed and approved by the PCB.

L B Roe

Richard Nygren
Chair, Payloads Control Board
National Aeronautics and Space Administration

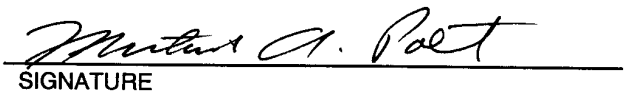
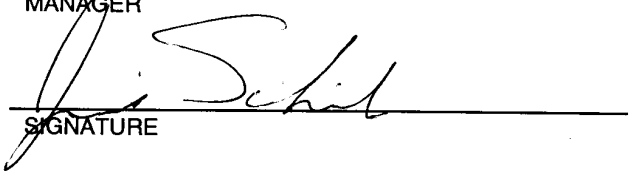
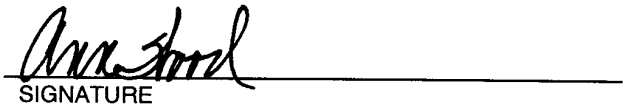
9/25/01
Date

INTERNATIONAL SPACE STATION PROGRAM

PAYLOAD INTEGRATION AGREEMENT INCREMENT ADDENDUM BLANK BOOK FOR PRESSURIZED PAYLOADS

CONCURRENCE

AUGUST 2001

Prepared by:	Mitchell Polt BOOK MANAGER	OZ2 ORG	
	 SIGNATURE	9/7/01 DATE	
Concurred by:	James Scheib PAYLOAD MISSION INTEGRATION AND PLANNING MANAGER	OZ2 ORG	
	 SIGNATURE	9.17.01 DATE	
NASA DQA:	Ann Wood CONFIGURATION MANAGEMENT REPRESENTATIVE	OL ORG	
	 SIGNATURE	5/24/01 DATE	

INTERNATIONAL SPACE STATION PROGRAM

PAYLOAD INTEGRATION AGREEMENT INCREMENT
ADDENDUM BLANK BOOK FOR PRESSURIZED PAYLOADS

LIST OF CHANGES

AUGUST 2001

All changes to paragraphs, tables, and figures in this document are shown below:

PCB	Entry Date	Change	Paragraph(s)
	October 2001	Baseline	All

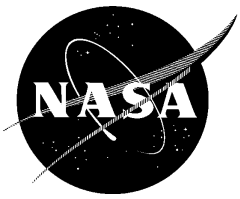
Payload Integration Agreement Increment Addendum for {Payload Name}

International Space Station Program

Baseline

{Date}

National Aeronautics and Space Administration
International Space Station Program
Johnson Space Center
Houston, Texas



INTERNATIONAL SPACE STATION PROGRAM

PAYLOAD INTEGRATION AGREEMENT INCREMENT ADDENDUM FOR {PAYLOAD NAME}

{DATE}

INTERNATIONAL SPACE STATION PROGRAM

PAYLOAD INTEGRATION AGREEMENT INCREMENT ADDENDUM FOR {PAYLOAD NAME}

APPROVAL

{DATE}

Payload Acronym: {Payload Acronym}

Payload Name: {Payload Name}

Payload Developer: {Payload Developer}

Approved by:

Name	
PAYLOADS OFFICE MANAGER	ORG
SIGNATURE	DATE

Approved by:

Name	
RESEARCH PROGRAM OFFICE	ORG
SIGNATURE	DATE

Approved by:

Name	
PROJECT MANAGER	ORG
SIGNATURE	DATE

INTERNATIONAL SPACE STATION PROGRAM

PAYLOAD INTEGRATION AGREEMENT INCREMENT ADDENDUM FOR {PAYLOAD NAME}

CONCURRENCE

{DATE}

Prepared by:	Name PAYLOAD INTEGRATION MANAGER	ORG
	SIGNATURE	DATE
Concurred by:	Name PAYLOAD MISSION INTEGRATION AND PLANNING MANAGER	ORG
	SIGNATURE	DATE
NASA DQA:	Name CONFIGURATION MANAGEMENT REPRESENTATIVE	ORG
	SIGNATURE	DATE

INTERNATIONAL SPACE STATION PROGRAM

PAYLOAD INTEGRATION AGREEMENT INCREMENT ADDENDUM FOR {PAYLOAD NAME}

APPROVING REPRESENTATIVES: PAYLOADS OFFICE MANAGER

Name: Office Code:

Telephone: Fax:

E-Mail:

Address:

PAYLOAD RESEARCH PROGRAM OFFICE MANAGER OR PAYLOAD PROGRAM MANAGER

Name: Office Code:

Telephone: Fax:

E-Mail:

Address:

PAYLOAD PROJECT MANAGER

Name: Office Code:

Telephone: Fax:

E-Mail:

Address:

DEVELOPING REPRESENTATIVES: PAYLOAD INTEGRATION MANAGER

Name: Office Code:

Telephone: Fax:

E-Mail:

Address:

PREFACE

PAYLOAD INTEGRATION AGREEMENT INCREMENT ADDENDUM FOR {PAYLOAD NAME}

This Payload Integration Agreement (PIA) Increment Addendum is the agreement between the {Research Program Office (RPO), Payload Developer (PD), or Appropriate Office} and the International Space Station (ISS) Program on the increment/flight-specific responsibilities and tasks which relate directly to integration of the Payload into the ISS. Signature on this PIA Increment Addendum constitutes technical agreement on the tasks to be performed.

[Any instructional information contained in this PIA Increment Addendum Blank Book is italicized and enclosed in brackets [example]. Information to be supplied is enclosed in braces and underlined {example}. *All instructional information will be removed for the increment/flight-specific PIA Increment Addendum.]*

All commitments and services to be furnished by the ISS Program to the {RPO, PD, or Appropriate Office} under this PIA Increment Addendum shall be furnished using its best efforts.

This PIA Increment Addendum, when baselined, becomes the controlling document for payload resources for an increment, superseding any previously agreed-to payload Mission Evaluation Request.

The flight dates shown in this PIA Increment Addendum are for planning purposes only.

Acronyms and abbreviations are found in Appendix A. The glossary of terms requiring definition is found in Appendix B. Open items which have not been determined are designated as To Be Determined (TBD) and are found in Appendix C. Items which need to be resolved will be designated as To Be Resolved (TBR) and are also found in Appendix C.

Tables with fields shaded require no payload data entry.

INTERNATIONAL SPACE STATION PROGRAM

PAYLOAD INTEGRATION AGREEMENT INCREMENT ADDENDUM FOR {PAYLOAD NAME}

LIST OF CHANGES

{DATE}

All changes to paragraphs, tables, and figures in this document are shown below:

Board Name	Entry Date	Change	Paragraph(s)

TABLE OF CONTENTS

APPENDIX

TABLE

FIGURE

1.0 INTRODUCTION

1.1 PURPOSE

This Payload Integration Agreement (PIA) Increment Addendum will contain all the relevant data to document the International Space Station (ISS) Program and the Research Program Office (RPO), Payload Developer (PD), or Appropriate Office requirements and commitments for launch date readiness for the increments applicable for the flight-to-flight period. This document applies to all ISS facility class and rack-level presurized payloads including complex operationally deployed payloads, but not covered by small payload, Window Observational Research Facility (WORF), or EXpedite the PRocessing of Experiments to the Space Station (EXPRESS) Requirements documents. The top-level requirements unique to the {Payload Name} for Increment {Increment Number} and Flight(s) {flight name(s), e.g., UF-1, etc.} date on or about {launch date} and for a planned return after completion of its on-orbit mission are documented in this PIA Increment Addendum. The PIA Increment Addendum is not a detailed collection of integration and operations requirements and data; such detailed information will reside in the Payload Data Sets. All sections of {Payload-unique PIA Increment Addendum document number} are applicable during this flight period except as modified by this PIA Increment Addendum. For the purpose of this document, the RPO, PD, and Appropriate Office are treated as equivalent entities.

A. The PD shall enter the appropriate information into each of the tables in the PIA Increment Addendum. If the requested information in the table is Not Applicable (N/A), N/A should be entered.

B. Section 3.0 of this PIA Increment Addendum describes the overall payload configuration and any changes that may occur during the flight period. The PD shall document the purpose/objectives, a payload description, the payload category, the microgravity operating sensitivity, and the ISS Program-Funded Space Shuttle Program (SSP) Services required by the payload.

1.2 SCOPE

This PIA Increment Addendum documents the ISS Program and transportation services, tactical parameters, prelaunch to ascent requirements, on-orbit requirements, return requirements, ancillary volume stowage requirements, training requirements, and the Program-provided ground support requirements, all on an increment and flight basis. These elements are necessary to accomplish the integration, launch, on-orbit operation, descent, and deintegration of the payload. The data sets document payload configuration, training, ground data services, payload operations, planning, Kennedy Space Center (KSC) Technical and Support requirements, as well as Extravehicular Activity (EVA) and Extravehicular Robotics (EVR) requirements. A complete description of each data set is specified in SSP 52000-PDS, Payload Data Sets Blank Book.

1.3 APPROVAL AUTHORITY

The PIA Increment Addendum and associated changes are to be approved jointly by the ISS Payloads Office and the RPO, PD, or Appropriate Office.

1.4 CONFIGURATION MANAGEMENT

Configuration control for this PIA Increment Addendum commences upon the last required signature of this document. The ISS Program will maintain configuration control of this document in accordance with SSP 41170, Configuration Management Requirements.

1.5 PRECENDENCE

In the event of inconsistency among payload integration documentation contained within the applicable documents, resolution will be achieved by observing the following order of precedence:

A. Safety documents

B. Payload-unique PIA

C. SSP 57059, Standard Payload Integration Agreement for Pressurized Payloads

D. PIA Increment Addendum

E. Payload Interface Control Documents (ICDs) referenced within SSP 57059 or PIA Increment Addendum

F. Payload Data Sets

G. SSP 57059 applicable documents other than A, B, C, D, E and F

2.0 DOCUMENTS

2.1 APPLICABLE DOCUMENTS

The following documents include specifications, models, standards, guidelines, handbooks, and other special publications. The current issue of the following documents is identified in the Program Automated Library System (PALS) (http://iss-www.jsc.nasa.gov/ss/issapt/pals) or Payload Integration Library System (PILS) (http://sspweb.jsc.nasa.gov/pils/payload.cfm). The documents listed in this paragraph are applicable to the extent specified herein. Inclusion of applicable documents herein does not in any way supersede the order of precedence identified in Paragraph 1.3 of this document.

SSP 41170	Configuration Management Requirements
SSP 52000-PDS	Payload Data Sets Blank Book
SSP 57059	Standard Payload Integration Agreement for Pressurized Payloads
NSTS 07700 Volume XIV Appendix 5	Space Shuttle System Payload Accommodations, System Description and Design Data - Ground Operations

2.2 REFERENCE DOCUMENTS

The following documents contain supplemental information to guide the user in the application of this document. These reference documents may or may not be specifically cited within the text of this document.

SSP 50200-01	Station Program Implementation Plan, Volume 1: Station Program Management Plan
SSP 50304	POIC Capabilities Document
SSP 50477	Joint Crew Provisioning Catalog
SSP 58311	Payload Operations Integration Center Payload Operations Handbook, Volume 1: Pre/Post Increment Operations
SSP 58312	Payload Operations Integration Center Payload Operations Handbook Volume 2: Increment Operations
SSP 58313A	NASA Payload Regulations
JSC 28533	International Space Station (ISS) Catalog of IVA Government Furnished Equipment (GFE) Flight Crew Equipment

ARC-BRP-40086	User Operations Facility Capabilities Document
LS 70053-2	JSC Telescience Support Center Capabilities Document
TSC-DOC-006	GRC Telescience Support Center User Guide
TSC-HDBK-001	MSFC Telescience Support Center Capabilities Document

3.0 PAYLOAD PURPOSE/OBJECTIVES

This section of the PIA Increment Addendum describes the overall payload configuration and any changes that may occur during the increment. The PD shall document the purpose/objectives, a payload description, the payload category, the microgravity (µg) operating sensitivity, and the services required by the payload.

3.1 PAYLOAD PURPOSE/OBJECTIVES STATEMENT

{Purpose/Objectives - A brief statement of the primary purpose and objectives of the payload. This description should be specific to this Increment.}

3.2 PAYLOAD DESCRIPTION

This section contains an increment-specific description of the payload, indicates what type of payload hardware will be flown, and the operation requirements for operating the payload during this Increment. If the payload description or operation is expected to change during the course of the increment, the operational scenarios will be described. The PD shall provide in the subsequent tables: the increment-specific payload description, the science or technology category of the payload, and the µg sensitivity level of the payload during this Increment.

3.2.1 INCREMENT-SPECIFIC PAYLOAD DESCRIPTION

{Brief Description - High-level description of the payload as it will operate during this Increment. Identify any other payloads which need to be co-manifested, co-located and/or operated concurrently for use by this payload during this Increment.}

3.2.2 INCREMENT-SPECIFIC PAYLOAD DRAWING

The PD shall provide a drawing(s) which depicts the payload in its proposed on-orbit configuration in Figure(s) 3.2.2-1, Increment-Specific Payload Drawing.

{PD insert drawing(s) here}

FIGURE 3.2.2-1 INCREMENT-SPECIFIC PAYLOAD DRAWING

3.3 PAYLOAD CATEGORY TYPE SELECTION

The PD shall provide the following information in Table 3.3-1, Payload Category Type Selection/Specification:

A. Payload Type - The payload science discipline or technology that best characterizes the payload during this Increment. The PD shall indicate the category of the payload by placing an X in the appropriate cells in the right column.

B. Other payload type - If payload type of “other” is selected, describe the payload type [200 characters max].

TABLE 3.3-1 PAYLOAD CATEGORY TYPE SELECTION/SPECIFICATION

Payload Type	Category
Biomedical Science	
Biotechnology	
Combustion Science	
Commercialization	
Earth Science	
Fluid Physics	
Gravitational Biology	
Materials Research	
Space Science	
Space Systems Technology	
Other (describe):	

3.4 ISS OPERATING MODE SENSITIVITY

The PD shall provide the following information in Table 3.4-1, ISS Operating Mode Sensitivity for Payload:

A. Microgravity Type - Select the µg type during this Increment by entering an X in the box to the right of the choice. Description of ISS µg types follow [select only one]:

   1. Sensitive - The contents of this payload carrier are sensitive to disturbances in the ISS µg environment.

   2. Disturber - The contents of this payload carrier will create disturbances to the ISS µg environment.

   3. Neither - This payload carrier is neither sensitive to disturbances in the ISS µg environment nor will they create disturbances in the ISS µg environment.

B. Level - Indicate the sensitivity and/or disturber level of the payload, if known, to the nearest order of magnitude in µg.

TABLE 3.4-1 ISS OPERATING MODE SENSITIVITY FOR PAYLOAD

Microgravity Type		Level (µg)
Sensitive		
Disturber		
Neither		

3.5 SERVICES

This section documents the SSP Services and ISS Program-funded SSP Services on a flight-by-flight basis, which are being requested by the PD. The SSP Services are further described in NSTS 07700, Volume XIV, Appendix 5, Space Shuttle System Payload, System Description and Design Data - Ground Operations. In addition, ISS

Program standard prelaunch and post-landing services are described in the Support Requirements Data Set found in SSP 52000-PDS.

The PD and the Payload Integration Manager (PIM) together will provide in the subsequent Table 3.5.1-1, SSP Services and ISS Program-Funded SSP Services, by flight: identification of hardware requiring the service, the service required, additional information, and a technical rationale for the service based on that specific hardware.

3.5.1 SSP SERVICES AND ISS PROGRAM-FUNDED SSP SERVICES REQUIREMENTS

The PD and the PIM shall provide the following information in Table 3.5.1-1.

A. Flight Number - The requested flight identification (ID) number (e.g., 7A.1, UF-6).

B. Location - Identify the site, such as KSC or Dryden Flight Research Center (DFRC), where the requested service is located.

C. Hardware Item - Identify the hardware that requires the service.

D. Service - Choose from the following list of SSP Services and ISS Program-funded SSP Services and enter data in table. (Reference SSP 57059, Section 7.0 for a description of these services.)

1. Multi-Purpose Logistics Module (MPLM) late access for installation of conditioned cargo.

2. Middeck (MDK) late access for payload turnover/servicing between Launch minus (L-)76 hours and L-28 hours.

   Category 1 - The payload requires late turnover/servicing within L-76 hours but prior to L-28 hours. The payload will be turned over from the PD to NASA KSC to allow installation in accordance with launch countdown and crew compartment stowage activities.

3. MDK late access for payload turnover/servicing (non-time specific) between L-28 hours and L-19.5 hours.

   Category 2 - The payload requires late turnover/servicing between L-28 hours and L-19.5 hours. The payload will be turned over from the PD to National Aeronautics and Space Administration (NASA) KSC to allow installation in accordance with a mission-unique stowage schedule.

4. MDK late access for payload turnover/servicing within a specific time between L-28 hours and L-19.5 hours (enter specific time in column for additional data).

   Category 3 - The payload requires late turnover/servicing within a specific time between L-28 hours and L-19.5 hours. The payload will be turned over from the PD to NASA KSC to allow installation in accordance with a mission-unique stowage schedule.

5. Prelaunch Orbiter power/cooling/data monitoring for an MDK payload.
6. Middeck Payload Servicing for planned launch delay margins less than or equal to 30 days:
    a. Enter payload expiration time in column for Additional Data as follows: The payload contains time critical science that expires within *[Insert number]* hours/days after payload hardware turnover to KSC. At this time, the payload is no longer viable for a successful launch and mission.
    b. For payloads requiring off-line refurbishment, enter specific time in column for Additional Data: The PD requires *[Insert number]* hours in an assigned offline processing facility to perform payload refurbishment.
7. Payload servicing for a launch delay less than or equal to 30 days (MPLM) (enter specific time in column for additional data).
8. Post-landing Orbiter power/cooling/data monitoring for an MDK payload.
9. Nominal End of Mission (EOM) MDK early turnover by either Return plus (R+)5.5 hours, R+8.5 hours, or R+25 hours. (Enter one of these choices in the column for Additional Data.)
10. Early End of Mission (EEOM) MDK early turnover by either R+5.5 hours, R+8.5 hours, or R+25 hours. (Enter one of these choices in the column for Additional Data.) NOTE: This is an ISS Program-funded SSP Service.
11. Early return of data products such as film or data diskettes to Johnson Space Center (JSC) via Time prior to launch minus (T-)38.
12. MPLM early access for removal of conditioned cargo.
13. Other.

C. Additional data - Enter any additional data necessary to describe the service required.

D. Technical Rationale - Provide a specific justification for the service such as specific potential research/science loss. This should consist of several sentences to quantify the science loss. Describe what would happen and how the science, safety, or schedule would be affected if the service is not provided. Category 3 MDK turnover requirements (late turnover/servicing within a specific time between L-28 hours and L-19.5 hours) must have a more detailed justification.

TABLE 3.5.1-1 SSP SERVICES AND ISS PROGRAM-FUNDED SSP SERVICES REQUIREMENTS

Flight Number	Location	Hardware Item	Service	Additional Data	Technical Rationale

[Expand table as required to document additional content.]

4.0 PRELAUNCH TO EARLY ON-ORBIT REQUIREMENTS

This section documents the requirements for the transportation of the payload to the ISS. The PD will identify in the subsequent tables per flight: the payload hardware, payload Launch Commit Criteria (LCC), maximum launch configuration, and the ascent to on-orbit requirements. Details of these requirements will be further documented in the various payload-specific Data Sets.

4.1 PAYLOAD HARDWARE INFORMATION

This section documents the payload hardware prelaunch processing and transportation scenario to the ISS. It also contains a description of the payload hardware with configuration data.

4.1.1 PRELAUNCH PROCESSING AND PAYLOAD TRANSPORTATION TO ISS ACTIVITIES

The PD shall provide the following information in Table 4.1.1-1, Scenario of Prelaunch Processing and Payload Transportation to ISS Activities:

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. Prelaunch to On-Orbit Activities - Define by flight the scenario describing prelaunch processing from hardware turnover through launch. Defined by flight the scenario describing transportation of the payload hardware to the ISS, which includes any reactivation of time-sensitive hardware.

TABLE 4.1.1-1 SCENARIO OF PRELAUNCH PROCESSING AND PAYLOAD TRANSPORTATION TO ISS ACTIVITIES

Flight Number	Prelaunch to On-Orbit Activities

[Expand table as required to document additional content.]

4.1.2 PAYLOAD HARDWARE DATA

The PD shall provide the following information in Table 4.1.2-1, Payload Hardware Data.

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. Payload Item - Constitutes a rack, or a subrack experiment(s) or groupings of payload related items manifested separately from the rack.

C. Special Payload Item Carrier/Location Requirements - Identify special carrier (Powered Double Middeck Locker (MDL), +4 degree Celsius (°C) Refrigerator) or location (MDK, MPLM, etc.) requirement to accommodate transporting the payload

to the ISS. If the payload item has no carrier or location requirement, identify N/A until the ISS determines the appropriate payload carrier/location.

Powered Single MDL	Powered Double MDL	Passive Single MDL	Passive Double MDL
4-Panel Unit ISIS Drawer	8-Panel Unit ISIS Drawer	12-Panel Unit ISIS Drawer	-183 °C Cryogenic Freezer
+4 °C Refrigerator	-20 °C Freezer	-80 °C Freezer	RSP
ASC	RSR	ETR	

D. Volume - The volume of the payload carrier inclusive of the payload hardware. If the hardware item is an International Standard Payload Rack (ISPR), Transportation Rack, MDL, or an International Subrack Interface Standard (ISIS) drawer, this cell is to be left blank.

E. Mass - The mass of the payload item listed in the table.

F. Additional Information - Information such as unique constraints/orientation, shapes and sizes, hazardous materials, etc., which might be pertinent to the ISS Program.

G. Total Mass/Flight - The total mass of the hardware item(s) inclusive of the payload hardware, by flight.

TABLE 4.1.2-1 PAYLOAD HARDWARE DATA

Flight Number	Payload Item	Special Payload Item Carrier/ Location Requirements	Volume (m^3)	Mass (kg)	Additional Information
			Total Mass/Flight:		

[Expand table as required to document additional content.]

4.2 PROGRAM FURNISHED EQUIPMENT

This section of the PIA Increment Addendum documents the flight-by-flight PD's requirements for Program Furnished Equipment (PFE) to support ground and flight activities within Increment {Increment number}. The ISS Program will review, provide, approve, and fabricate all decals.

4.2.1 GROUND REQUIREMENTS

The PD shall provide the following information in Table 4.2.1-1, Program Furnished Equipment Ground Requirements:

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. Location - The location where the PFE is to be provided (e.g., KSC, PD site).

C. Equipment - List the PFE ground hardware required by the PD, for his use (e.g., Rack Handling Adapter, Rack Shipping Container, Suitcase Test Environment for Payloads, Payload Rack Checkout Unit). Hardware to be listed in this table includes ISS Fleet Resources and other ISS-provided hardware but does not include KSC-provided hardware and equipment to be used by the PD at KSC. KSC-provided hardware and equipment to be used at KSC shall be entered in the KSC Support Requirements Data Set.

D. Need Date - The date by which the equipment is needed (e.g., L-24 months to L-12 months).

E. Duration - The length of time from launch the equipment is needed (e.g., L-24 months to L-12 months).

TABLE 4.2.1-1 PROGRAM FURNISHED EQUIPMENT GROUND REQUIREMENTS

Flight Number	Location	Equipment	Need Date	Duration

[Expand table as required to document additional content.]

4.2.2 FLIGHT REQUIREMENTS

The PD shall provide the following information in Table 4.2.2-1, Program Furnished Equipment Flight Requirements. This includes any PFE required to support the flight integration and support operations required to be performed on the Shuttle.

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. Location - The location where the PFE is to be provided (e.g., KSC, PD site).

C. Equipment - The PFE flight hardware to be used by the PD, including carrier requirements (e.g., MDL, SSP Payload Mounting Panel, ISIS Stowage Drawer, Payload General Support Computer (PGSC), SSP Power Cable).

D. Need Date - The date by which the equipment is needed (e.g., L-24 months to L-12 months).

E. Duration - The length of time from launch that the equipment is needed (e.g., L-24 months to L-12 months).

TABLE 4.2.2-1 PROGRAM FURNISHED EQUIPMENT FLIGHT REQUIREMENTS

Flight Number	Location	Equipment	Need Date	Duration

NOTE: List only one item per line.

[Expand table as required to document additional content.]

4.3 PAYLOAD LAUNCH COMMIT CRITERIA

This section contains the payload LCC. Criteria for developing payload constraints for Shuttle launches are identified in NSTS 07700, Volume XIV, Appendix 5, Section 6.

4.3.1 LAUNCH COMMIT CRITERIA REQUIREMENTS

The PD shall provide the following LCC information in Table 4.3.1-1, Payload Launch Commit Criteria:

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. Payload Item - Constitutes a rack, or a subrack experiment(s) or groupings of payload related items manifested separate from the rack.

C. Payload LCC - The requirements, negotiated by the ISS Program, the Launch Vehicle office, and the PD, which could cause launch holds.

D. Technical Rationale - A justification for the need of the LCC. Provide a specific justification for the LCC such as the specific potential research/science loss. This should consist of several sentences to quantify the science loss. Describe what would happen and how the science, safety, or schedule would be affected if the LCC is not approved.

TABLE 4.3.1-1 PAYLOAD LAUNCH COMMIT CRITERIA

Flight Number	Payload Item	Payload LCC	Technical Rationale

[Expand table as required to document additional content.]

4.4 PAYLOAD MAXIMUM LAUNCH CONFIGURATION

The maximum launch configuration duration is the amount of time the Payload Rack/Payload Items can sustain its launch configuration from turnover/last servicing without physical access. The Payload Rack has a launch configuration duration based on turnover/last servicing just prior to or during Payload Test and Checkout System (PTCS) integration and test at approximately L-5 months. Subrack Payload Items requiring MPLM time-critical installation have a launch configuration duration based on

turnover/last servicing just prior to completion of MPLM payload closeouts in the Space Station Processing Facility (SSPF) at approximately L-2.5 months. Subrack Payload Items requiring MPLM late access, such as conditioned cargo, have a launch configuration duration based on turnover/last servicing just prior to the completion of MPLM access at L-88 hours. Payload Items requiring MDK access have a launch configuration duration based on turnover/last servicing beginning at approximately L-2 weeks for standard bag stow, beginning at approximately L-8 days for standard locker stow and beginning at approximately L-76 hours for late stow.

In Table 4.4.1-1, Payload Maximum Launch Configuration Duration, provide the Flight Number, Payload Rack/Payload Item, Estimated Turnover/Last Servicing Time Frame, Required Maximum Launch Configuration Duration, Planned Launch Delay Margin, and the related Technical Rationale.

NOTE: MDK payload and conditioned cargo planned launch delay margins less than or equal to 30 days (for example, 24 hours, 48 hours, 72 hours, 96 hours, and 120 hours) are also to be negotiated, technically justified, and documented in Section 3.5 of this PIA Increment Addendum.

4.4.1 PAYLOAD MAXIMUM LAUNCH CONFIGURATION DURATION

The PD shall provide the following Launch Configuration Duration information in Table 4.4.1-1 for each Payload Rack and related Payload Items as required:

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. Payload Rack/Payload Item - Constitutes a rack, or a subrack experiment(s) or groupings of payload related items manifested separate from the rack.

C. Estimated Turnover/Last Servicing Time Frame (L-XX) - The Estimated Turnover or Last Servicing of the Payload item which starts the Launch Configuration Duration time frame. Identify this L-XX time frame in months, days, or hours.

D. Required Maximum Launch Configuration Duration (Months/Days/Hours) - The maximum time the payload can sustain launch configuration from the Estimated Turnover/Last Servicing Time Frame without physical access. Identify this duration by indicating the number of months, days, or hours or by indicating “Indefinitely.”

E. Planned Launch Delay Margin - Identify the amount of Planned Launch Delay Margin by subtracting C from D or by indicating “Indefinitely.”

F. Technical Rationale - A justification for the Required Maximum Launch Configuration Duration limitation. Provide a specific justification for the duration such as the specific potential research/science loss. This should consist of several sentences to quantify the science loss. Describe what would happen and how the science, safety, or schedule would be affected if the limitation is exceeded. Identify any specific hardware inside the Payload Rack/Payload Item that is causing the limitation.

TABLE 4.4.1-1 PAYLOAD MAXIMUM LAUNCH CONFIGURATION DURATION

Flight Number	Payload Rack/ Payload Item	Estimated Turnover/Last Servicing Time Frame (L-XX)	Required Maximum Launch Configuration Duration (Months/Days/Hours)	Planned Launch Delay Margin	Technical Rationale

[Expand table as required to document additional content.]

4.5 ASCENT TO ON-ORBIT PAYLOAD RESOURCE REQUIREMENTS

This section documents on a flight basis, the resource transportation, payload transport and transfer, and flight crew time requirements from pre-Payload Bay Door (PLBD) closure to the completion of payload assembly/installation. The PD will specify in the subsequent tables, by flight: the transport, payload transfer, and the flight crew time requirements.

4.5.1 ASCENT TO ON-ORBIT PAYLOAD RESOURCE TABLE

The PD shall provide the following information in Table 4.5.1-1, Resource Transportation Requirements:

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. Payload Item - Constitutes a rack, or a subrack experiment(s) or groupings of payload related items manifested separate from the rack (applies only to those identified as being in powered carriers in Table 4.1.2-1).

C. Resource - The power (kiloWatt (kW)), command/data (Megabits per second (Mbps)), telemetry (Mbps), and heat removal method (kW or kilogram (kg)/hour) needed to be provided by the carrier vehicle to support the payload during each transportation phase to support payload operations.

D. Pre-PLBD Closure - The average and peak resource needed during period of time from payload insertion into the Orbiter Bay to PLBD closure for flight. The peak resource requirement will be identified in parentheses. In addition, for power, indicate the length of time, in minutes, identified payloads can be unpowered by placing this value in brackets.

E. Post-PLBD Closure - The average and peak resource needed during period of time from PLBD closure for flight to Solid Rocket Booster (SRB) ignition. (Ascent software configuration loading +6 at T-20.) In addition, for power, indicate the length of time, in minutes, that identified payloads can be unpowered by placing this value in brackets.

F. Ascent - The average and peak resource needed during period of time from SRB ignition through the establishment of a stable orbit (typically post-Orbital Maneuvering System (OMS) second burn). In addition, for power, indicate the

length of time, in minutes, identified payloads can be unpowered by placing this value in brackets.

G. Pre-Assembly - The average and peak resource needed during period of time from just after the establishment of a stable orbit until the start of the Cargo Element (CE) deployment or assembly operations (e.g., docking). In addition, for power, indicate the length of time, in minutes, identified payloads can be unpowered by placing this value in brackets.

H. During Assembly - The average and peak resource needed during period of time from the start of the activity or assembly sequence until the completion of the CE assembly operations (e.g., docked operation, re-powering time-sensitive hardware). In addition, for power, indicate the length of time, in minutes, identified payloads can be unpowered by placing this value in brackets.

I. Interface Routing - Indicate the interface routing based on the resource type below.

Power	**Command/Data**	**Telemetry**	**Heat Removal**
Orbiter MDK Power	MPLM MDM to Payload	MPLM MDM to Payload	MDK Cabin Air (kW)
Cabin P/L Bus to PCS	PCS to MDK	PCS to MDK	MDK Rear Duct Air (kg/hr)
Safing	Other	Other	MPLM to LTL (kg/hr)
MPLM to Payload			Other
Other			

TABLE 4.5.1-1 RESOURCE TRANSPORTATION REQUIREMENTS

Flight Number	Payload Item	Resource (kW, kg/hour or Mbps)	Pre-PLBD Closure	Post-PLBD Closure	Ascent	Pre-Assembly	During Assembly	Interface Routing

[Expand table as required to document additional content.]

4.5.2 TRANSPORT AND TRANSFER REQUIREMENT

PD shall provide the following information in Table 4.5.2-1, Transport and Transfer Requirements:

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. Payload Item - Constitutes a rack, or a subrack experiment(s) or groupings of payload related items manifested separate from the rack.

C. Description of Transport Requirements - A description of the special requirements, if any, for the transportation of the payload hardware to ISS (e.g., launch orientation, temperature, early on-orbit requirements, special handling).

D. Description of Transfer Requirements - A description of the special requirements, if any, for transferring the payload hardware from the Orbiter to the ISS.

TABLE 4.5.2-1 TRANSPORT AND TRANSFER REQUIREMENTS

Flight Number	Payload Item	Description of Transport Requirements	Description of Transfer Requirements

[Expand table as required to document additional content.]

4.5.3 FLIGHT CREW TIME REQUIREMENTS

The PD shall provide the following information in Table 4.5.3-1, Flight Crew Time Requirements:

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. Total Crew Time During Ascent and Early On-Orbit (Hours) - The total amount of crew time needed to perform activities in support of payload operations during this mission phase. The total time needed should include onboard training and overhead time (e.g., to access, set up, and tear down support equipment).

C. Description of Flight Crew Requirements - A description of the crew activities being performed in support of payload operations during the mission phase.

TABLE 4.5.3-1 FLIGHT CREW TIME REQUIREMENTS

Flight Number	Total Crew Time During Ascent and Early On-Orbit (Hours)	Description of Flight Crew Requirements

[Expand table as required to document additional content.]

5.0 ON-ORBIT ISS REQUIREMENTS

This section documents the on-orbit requirements for the payload for operation in the ISS for Increment {Increment number}. The PD will identify in the subsequent tables: the payload rack definition and payload carrier placement criteria, payload stowage, and on-orbit requirements. Details of these requirements will be further documented in one or more of the Data Sets.

5.1 PAYLOAD DEFINITION AND PAYLOAD CARRIER PLACEMENT

This section describes payload hardware placement criteria, if any. Table 5.1.1-1, Payload Definition and Placement Criteria, provides further details on any payload operational µg sensitivities. The PD will specify, in the subsequent table, the payload carrier and the payload placement criteria.

5.1.1 PAYLOAD DEFINTION AND PLACEMENT CRITERIA

The PD shall provide the following information in Table 5.1.1-1:

A. Payload Item - Constitutes a rack, or a subrack experiment(s) or groupings of payload related items manifested separate from the rack.

B. Payload Placement Criteria - Any criteria for the placement of the payload carrier, including any requested module, co-location requirements, special handling requirements, or operational sensitivities. Include the intended use of a temporary attachment to the payload that will extend into the aisle of the ISS laboratory (e.g., ergometer or glove box).

TABLE 5.1.1-1 PAYLOAD DEFINITION AND PLACEMENT CRITERIA

Payload Item	Payload Placement Criteria

[Expand table as required to document additional content.]

5.2 PAYLOAD STOWAGE REQUIREMENTS

This section documents the on-orbit stowage requirements of the payload. The stowage requirements in this table are for those items which will be accommodated outside the experiment rack(s) that contain the payload hardware.

The PD will define the following in the subsequent table, from flight to flight, if appropriate: the stowage location, the time when the stowage is needed, the volume, and a brief description of any special stowage requirements.

5.2.1 STOWAGE CONTAINER/ACCOMMODATION

The PD shall provide the following information in Table 5.2.1-1, Payload Stowage Requirements:

A. Payload Item - Constitutes a rack, or a subrack experiment(s) or groupings of payload related items manifested separate from the rack.

B. Stowage Container/Accommodation - The container or location where the requested item will be stored. Below is a list of the stowage containers and locations.

+4 °C Refrigerator	-20 °C Freezer	-80 °C Freezer	-183 °C Cryogenic Freezer
Incubator	ISS Locker	ASC	Soft Stowage
Stowage Drawers	Nonhazardous Trash Container	Hazardous Trash Container	
Other/No Requirements			

C. From Flight Number - The flight number in the increment which begins when the stowage is needed.

D. To Flight Number - The flight number in the increment which ends when the stowage is needed.

E. Volume - The volume of the stowage being requested if the storage container is not specified. Dimensions are recorded in the Configuration Data Set.

F. Description of Special Stowage Requirements and Operationally Deployed Volume - List any special requirements for stowage (e.g., constraints/orientation, hazardous materials, environment and location constraints, biomedical waste) and provide the operationally deployed volume if different from ascent/descent stowage volume provided in Tables 4.1.2-1 and 6.1.2-1, Payload Hardware Description.

TABLE 5.2.1-1 PAYLOAD STOWAGE REQUIREMENTS

Payload Item	Stowage Container/ Accommodation	Stowage Duration		Stowage Container	Description of Special Stowage Requirements and Operationally Deployed Volume
		From Flight Number	To Flight Number	Volume (m^3)	

[Expand table as required to document additional content.]

5.3 LABORATORY/STATION SUPPORT EQUIPMENT AND ACCOMMODATIONS

The contents of this section list the Laboratory Support Equipment (LSE), Station Support Equipment (SSE), and accommodations which are available on the ISS to support the payload operation. The PD will select from the list of those items which are required.

5.3.1 LABORATORY SUPPORT EQUIPMENT FOR PAYLOAD OPERATION

The PD shall provide the following information in Table 5.3.1-1, Laboratory Support Equipment Requirements:

A. LSE Item - Specify which of the LSE items listed below are required to support operations of the payload.

Compound Microscope	Cryogenic Storage Freezer	Digital Thermometer
Dissecting Microscope	Quick/Snap Cryogenic Freezer	Micro Mass Measuring Device
Incubator	MELFI	Small Mass Measuring Device
Passive Dosimeter System		

B. Duration - Specify the duration of time, frequency of use, and which ISS stage or increment the LSE item will be required for operations (e.g., required for 45 minutes, once every 20 days during UF-1 stage).

C. Justification/Comments - Enter a justification of what the LSE item will be used for and the payload/experiment with which it is associated. Enter any comments pertaining to use of the LSE item.

TABLE 5.3.1-1 LABORATORY SUPPORT EQUIPMENT REQUIREMENTS

LSE Item	Duration	Justification/Comments

[Expand table as required to document additional content.]

5.3.2 ISS SUPPORT EQUIPMENT FOR PAYLOAD OPERATION

The PD shall provide the following information in Table 5.3.2-1, ISS Support Equipment Requirements:

A. SSE Item Name - Specify each of the SSE items by part name that are required to support operations of the payload. Listed below are SSE categories and part names. For reference, SSE part names and information can be found in JSC 28533, International Space Station (ISS) Catalog of IVA Government Furnished Equipment (GFE) Flight Crew Equipment, and SSP 50477, Joint Crew Provisioning Catalog.

<u>Cleaning Equipment</u>

Utensil Detergent Wipe
Detergent Wipe
Utensil Rinse Wipe Assembly
Disinfectant Wipe
Durable Wipe
Dry Wipe

Surfactant Liquid
Portable Wet/Dry Vacuum Cleaner

Restraints and Mobility Aids

Small Non-Adjustable Bungee, 8 inch
Large Non-Adjustable Bungee, 14 inch
Small Adjustable Bungee, 18 - 36 inch
Large Adjustable Bungee, 36 - 72 inch
Cable Restraint, 1.75 inch
Long Duration Crew Member Restraint
Panel Cover, 16 x 41 inches
Pile Fastener Restraint
Rack Retention Net, 32 x 38 inches
Flexible Bracket
Multiuse Bracket
PGSC Desk
Rack Seat Track Stud, 1.12 inner diameter
Hand Rail Clamp with seat track interface

Diagnostics Equipment

Power Supply - 0 to 150 Volt (V) at 7 Amp (A)
Diagnostic Caddy
Hewlett Packard (HP) 8116A Sweep Generator
Fluke 105B Scopemeter
Acoustic Meter - portable, 20 to 140 decibel
Maintenance Work Area
Intravehicular Activity (IVA) Driver/Drill

Inventory Management

Bar Code Reader

Portable Illumination

Portable Utility Light

Imagery

Digital Still Camera
Still Camera - (35 millimeter (mm))
ISS General Purpose Video Camera - (Digital Camcorder)

IVA Hand Tools - List specific IVA Tools required by part name referenced in JSC 28533.

Other - List any other required certified items by part name that are not in this list.

B. Quantity - Enter the quantity of each SSE item that is required to support operations of the payload.

C. Duration - Specify the duration of time, frequency of use, and which ISS stage or increment the SSE item will be required for operations (e.g., required for 45 minutes, once every 20 days during UF-1 stage).

D. Justification/Comments - Enter a justification of what the SSE item will be used for and the payload/experiment with which it is associated. Enter any comments pertaining to use of the SSE item.

TABLE 5.3.2-1 ISS SUPPORT EQUIPMENT REQUIREMENTS

SSE Item Name	Quantity	Duration	Justification/Comments

5.4 ON-ORBIT RESOURCE REQUIREMENTS

This section summarizes the on-orbit resources of the payload for Increment {Increment number}. These requirements include electrical power, vacuum exhaust system, environmental control life-support systems, thermal, data uplink and downlink, video uplink and downlink, payload-to-payload communications, crew support/subject and consumable resources.

5.4.1 INCREMENT ON-ORBIT RESOURCE REQUIREMENTS

The PD shall provide the following information in Table 5.4.1-1, Total On-Orbit Resource Requirements. This section provides a summary of the ISS consumable resource allocations required to support payload operations during the increment based on a summation (where applicable) or typical values. An example of a resource to be summed would be kg of usage during an increment. An example of a typical resource rate would be kilobits per second (kbps). Note that potable water must be transported to the payload by a crewmember.

The following definitions explain the column heading in Table 5.4.1-1:

A. Resource - Specific resource required by the payload.

B. Peak Quantity - The peak amount of the resource required in the units specified. *Peak power quantity is defined as the typical maximum power drawn, above the nominal draw, which occurs for greater than ten milliseconds during the increment.

C. Peak Duration - A summation of the duration for the associated typical Peak Quantity in the units specified for the increment.

D. Off-Peak Quantity - The average off-peak amount of the resource required in the units specified. *Off-Peak Power Quantity is defined as the typical nominal continuous power drawn by a given payload configuration during the increment. If

there is a minor variation in power consumption within the given increment, the normalization (or average) of the power drawn is acceptable.

E. Off-Peak Duration - A summation of the duration for the associated typical Off-Peak Quantity in the units specified for the increment.

The PD shall provide the following on-orbit consumable requirements:

*A. Utility Interface Panel (UIP) Power - The typical power drawn at the UIP.

*B. Auxiliary - The typical power drawn from the auxiliary power interface.

*C. Utility Outlet Panel (UOP) Power - The typical power drawn from the UOP.

D. Vacuum Exhaust Rate - The typical rate of vacuum vent.

E. Vacuum Resource Duration - The summation of duration of vacuum use as a resource in the rack.

F. Moderate Temperature Loop (MTL) Flowrate - The typical flowrate of fluid through the MTL in the rack.

G. MTL Heat Rejection - The typical amount of heat dissipated into the MTL per unit of time.

H. Low Temperature Loop (LTL) Flowrate - The typical flowrate of fluid through the LTL in the rack.

I. LTL Heat Rejection - The typical amount of heat dissipated into the LTL per unit of time.

J. Latent Cabin Air Heat Dissipation - The typical heat with moisture (humidity) dissipated into the cabin (e.g., life sciences payloads).

K. Sensible Cabin Air Heat Dissipation - The typical heat without moisture dissipated into the cabin.

L. Data Uplink - The typical rate of data uplinked to ISS and routed to the rack via the ISS 1553B Payload Bus.

M. Low-Rate Data Downlink - The typical rate of data transmitted from the rack to the ground via the ISS 1553B Payload Bus. The requirements should split into the following subcategories: Payload Health and Status and low-rate telemetry.

N. Medium-Rate Data Downlink - The typical rate of data transmitted from the rack to the ground via the ISS Payload Ethernet Bus.

   a. Words per packet

   b. Packets per second and its duration

   c. Duration between sessions

O. High-Rate Data Downlink - The typical rate of data transmitted from the rack to the ground via the ISS High-Rate Data Link. Video downlink - The typical rate of data transmitted from the rack to the ground via the digital camera through the High-Rate Frame Multiplexer (HRFM).

P. Video Uplink - The typical rate of video uplinked to ISS and routed to the rack via the ISS video system.

Q. Video Downlink Bit and Frame Field Data - The typical rate via the analog camera through the ISS Video Baseband Signal (VBS) Processor.

R. Medium-Rate Date Transfer to Another Rack - The typical rate of data transmitted to another rack via the ISS Payload Ethernet Bus.

S. High-Rate Data Transfer to Another Rack - The typical rate of data transmitted to another rack via the ISS High-Rate Data Link.

T. Crew Support - The number of crewpersons required for the increment and the amount of time in minutes each is needed.

U. Gaseous Nitrogen Consumption - The aggregate amount of plumbed gaseous nitrogen consumed for the increment, the amount of plumbed gaseous nitrogen vented to the cabin atmosphere for the increment, and the amount of plumbed gaseous nitrogen vented to space vacuum through the Vacuum System for the increment.

V. Argon Consumption - The aggregate amount of argon consumed for the increment.

W. Helium Consumption - The aggregate amount of helium consumed for the increment.

X. Carbon Dioxide Consumption - The aggregate amount of carbon dioxide consumed for the increment.

Y. Potable Water Consumption - The aggregate amount of potable water used for the increment. The amount of potable water used should list the total amount removed at the Environmental Control and Life Support (ECLS) interface with no reductions for the amount that will be returned as condensate/latent heat load since that will be included in the Latent Cabin Air Heat Dissipation input. This capability is not available until after Node 3 has been fully outfitted on-orbit.

Z. Oxygen Consumption - The aggregate amount of oxygen consumed from the atmosphere for the increment (e.g., life sciences payload).

AA. Air Consumption - The aggregate amount of cabin air that is vented overboard due to payload operations for the increment.

BB. Carbon Dioxide Addition - The aggregate amount of carbon dioxide that will be added to the cabin atmosphere. This input shall not include any amount that is included in the Carbon Dioxide Consumption input for plumbed carbon dioxide vented to cabin atmosphere for the increment.

CC. Orbiter Transferred Water Consumption - The aggregate amount of Orbiter transferred water that is used for the increment. The input shall also specify if the biocide in the Orbiter transferred water will be iodine (1-4 parts per million (ppm) iodine) or silver (0.3-0.5 ppm silver) or not biocide at all.

DD. Partial Pressure of Carbon Dioxide Level - The requested unique average and peak partial pressure of carbon dioxide levels in the cabin aisle way for the increment. The nominal ISS partial pressure of carbon dioxide levels in the cabin aisle way is a daily average of 5.3 mm Mercury (Hg) with a peak of less than or greater to 7.6 mm Hg.

EE. Condensate Absorption - The aggregate amount of water vapor removed from the atmosphere for the increment.

FF. Microgravity Disturber - A typical (worst case) µg disturber force for this increment.

GG. Microgravity Disturber - A typical frequency range associated with the µg disturber force.

HH. Microgravity Sensitive - A typical (worst case) µg sensitive level for this increment.

II. Microgravity Sensitive - A typical frequency range associated with this µg sensitive level.

TABLE 5.4.1-1 TOTAL ON-ORBIT RESOURCE REQUIREMENTS (PAGE 1 OF 2)

RESOURCE	Peak		Off-Peak	
	Quantity	Duration	Quantity	Duration
UIP Power (Watts and hours)				
Auxiliary (Watts and hours)				
UOP Power (Watts and hours)				
Vacuum Exhaust Rate (kg/minute and minutes)				
Vacuum Resource Duration (minutes duration)				
MTL Flowrate (kg/hr and hours)				
MTL Heat Rejection (Watts and hours)				
LTL Flowrate (kg/hr and hours)				
LTL Heat Rejection (Watts and hours)				
Latent Cabin Air Heat Dissipation (Watts and hours)				
Sensible Cabin Air Heat Dissipation (Watts and hours)				
Data Uplink (kbps and seconds)				
Low-Rate Data Downlink Rate/Duration (kbps and seconds)				
Health and Status				
Low Rate Telemetry				
Medium-Rate Data Downlink Rate/Duration				
a. Words per packet				
b. Packets per second				
c. Duration between sessions				
High-Rate Data Downlink Including Digitized Video Rate/Duration (Mbps and seconds)				
Video Uplink Rate/Duration (Mbps and seconds)				
Video Downlink Bit and Frame Field Data and Seconds Select from the following: 6 bit, 30 full-frame fields/second/Seconds 6 bit, 30 half-frame fields/second/Seconds 6 bit, 15 half-frame fields/second/Seconds 6 bit, 7.5 half-frame fields/second/Seconds 6 bit, 1.875 half-frame fields/second/Seconds 8 bit, 30 full-frame fields/second/Seconds 8 bit, 30 half-frame fields/second/Seconds 8 bit, 15 half-frame fields/second/Seconds 8 bit, 7.5 half-frame fields/second/Seconds 8 bit, 1.875 half-frame fields/second/Seconds				
Medium-Rate Data Transfer to Another Rack				
a. Words per packet				
b. Packets per second				
c. Duration between sessions				
High-Rate Data Transfer to Another Rack (Mbps and Seconds)				
Crew Support (number of persons and minutes)				
Gaseous Nitrogen Consumption (kg)				
a. Total gaseous nitrogen				
b. Amount vented to cabin atmosphere				
c. Amount vented to space vacuum exhaust				
Argon Consumption (kg)				
Helium Consumption (kg)				
Carbon Dioxide Consumption (kg)				
Potable Water Consumption (kg)				

TABLE 5.4.1-1 TOTAL ON-ORBIT RESOURCE REQUIREMENTS (PAGE 2 OF 2)

RESOURCE	Peak		Off-Peak	
	Quantity	Duration	Quantity	Duration
Oxygen Consumption (kg)				
Air Consumption (kg)				
Carbon Dioxide Addition (kg)				
Orbiter Transferred Water Consumption (kg)				
Partial Pressure of Carbon Dioxide Level (mm Hg)				
Condensate Absorption (kg)				
Microgravity Disturber: Force (µg level and minutes)				
Microgravity Disturber: Frequency Range (Hz)				
Microgravity Sensitive: Level (µg level and minutes)				
Microgravity Sensitive: Frequency Range (Hz)				

5.4.2 ADDITIONAL DESIRED RESOURCE REQUIREMENTS

The PD shall provide the following information in Table 5.4.2-1, Additional Desired Resource Requirements: Any additional resources that a payload may want, that ISS cannot commit to at this time; i.e., Payload “desirements” that can be identified as a “soft-commit” by ISS. The column header definitions are the same as Table 5.4.1-1.

TABLE 5.4.2-1 ADDITIONAL DESIRED RESOURCE REQUIREMENTS

RESOURCE	Peak		Off-Peak	
	Quantity	Duration	Quantity	Duration

6.0 RETURN REQUIREMENTS

This section documents the payload hardware transportation scenario from the ISS and post-landing processing requirements. It also contains a description of the payload hardware with configuration data. The PD will identify in the subsequent tables, per flight, the payload hardware and return requirements. Details of these requirements will be further documented in the various payload-specific Data Sets.

6.1 PAYLOAD ACTIVITIES AND HARDWARE

This section provides a scenario describing the landing activities on a flight-by-flight basis during this Increment and provides a brief description of the payload hardware being transported from ISS.

6.1.1 RETURN SCENARIO ACTIVITIES

The PD shall provide the following information in Table 6.1.1-1:

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. On-Orbit to Post-Landing Activities - Define by flight the scenario describing transportation of the payload hardware from the ISS which includes any reactivation of time-sensitive hardware. Define by flight the scenario describing post-landing processing from wheel stop to hardware turnover to the PD.

TABLE 6.1.1-1 RETURN SCENARIO ACTIVITIES

Flight Number	On-Orbit to Post-Landing Activities

[Expand table as required to document additional content.]

6.1.2 PAYLOAD HARDWARE DESCRIPTION

The PD shall provide the following information in Table 6.1.2-1:

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. Payload Item - Constitutes a rack or subrack experiment(s) or groupings of payload-related items manifested separate from the rack.

C. Special Payload Item Carrier/Location Requirements - Identify special carrier (Powered Double MDL, +4 °C Refrigerator) or location (MDK, MPLM, etc.) requirement to accommodate transporting the payload from the ISS. If the payload item has no carrier or location requirement, identify as N/A until ISS determines the appropriate payload carrier/location.

ASC		RSP	RSR
Powered Single MDL	Passive Double MDL	Passive Single MDL	Powered Double MDL
4-Panel Unit ISIS Drawer	8-Panel Unit ISIS Drawer	12-Panel Unit ISIS Drawer	-183 °C Cryogenic Freezer
+4 °C Refrigerator	-20 °C Freezer	-80 °C Freezer	

D. Volume - The volume of the payload carrier inclusive of the payload hardware. If the hardware item is an ISPR, Transportation Rack, MDL, or an ISIS drawer, this cell is to be left blank.

E. Mass - The mass of the payload item listed in the table.

F. Additional Information - Information such as constraints/orientation, unique shapes and sizes, hazardous materials, etc., which might be pertinent to the ISS Program.

G. Total Mass/Flight - The total mass of the hardware item(s) inclusive of the payload hardware, by flight.

TABLE 6.1.2-1 PAYLOAD HARDWARE DESCRIPTION

Flight Number	Payload Item	Special Payload Item Carrier/ Location Requirements	Volume (m^3)	Mass (kg)	Additional Information
			Total Mass/Flight:		

[Expand table as required to document additional content.]

6.2 ON-ORBIT TO RETURN PAYLOAD REQUIREMENTS

This section documents, on a flight-by-flight basis, the resource transportation, payload transport and transfer, and flight crew time requirements from payload disassembly/installation to post-flight. The PD will specify the following in the subsequent tables, by flight: the transport, payload transfer, and the flight crew time requirements.

6.2.1 RESOURCE TRANSPORTATION REQUIREMENTS

The PD shall provide the following information in Table 6.2.1-1, Resource Transportation Requirements:

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. Payload Item - Constitutes a rack, or a subrack experiment(s) or groupings of payload-related items manifested separate from the rack (applies only to those identified as being in powered carriers in Table 4.1.2-1).

C. Resource - The power (kW), command/data (Mbps), telemetry (Mbps), and heat removal method (kW or kg/hour) needed during each transportation phase to be provided by the carrier vehicle to support payload operations.

D. Assembly Average (Peak) - The average and peak resource needed during the period of time from the start of the activity or assembly sequence until the completion of the payload assembly operations; i.e., undocked operations. The peak resource requirement will be identified in parentheses. In addition, for power, indicate the length of time, in minutes, identified payloads can be unpowered by placing this value in brackets.

E. Post-Assembly Average (Peak) - The average and peak resource needed during period of time from the completion of the payload assembly operations (undocking) to start of preparation for entry. The peak resource requirement will be identified in parentheses. In addition, for power, indicate the length of time, in minutes, identified payloads can be unpowered by placing this value in brackets.

F. Descent Average (Peak) - The average and peak resource needed during period of time from start of preparation for entry through wheelstop. The peak resource requirement will be identified in parentheses. In addition, for power, indicate the length of time, in minutes, identified payloads can be unpowered by placing this value in brackets.

G. Post-Flight Average (Peak) - The average and peak resource needed during period of time from wheelstop to the removal of a return complement. The peak resource requirement will be identified in parentheses. In addition, for power, indicate the length of time, in minutes, identified payloads can be unpowered by placing this value in brackets.

H. Interface Routing - Indicate the interface routing based on the resource type below:

Power	**Command/Data**	**Telemetry**	**Heat Removal**
Orbiter MDK Power	MPLM MDM to Payload	MPLM MDM to Payload	MDK Cabin Air (kW)
Cabin P/L Bus to PCS	PCS to MDK	PCS to MDK	MDK Rear Duct Air (kg/hr)
Safing	Other	Other	MPLM to LTL (kg/hr)
MPLM to Payload			Other
Other			

TABLE 6.2.1-1 RESOURCE TRANSPORTATION REQUIREMENTS

Flight Number	Payload Item	Resource (kW, kg/hour, or Mbps)	Assembly Average (Peak)	Post-Assembly Average (Peak)	Descent Average (Peak)	Post-Flight Average (Peak)	Interface Routing

[Expand table as required to document additional content.]

6.2.2 TRANSPORT AND TRANSFER REQUIREMENTS

The PD shall provide the following information in Table 6.2.2-1, Transport and Transfer Requirements:

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. Payload Item - Constitutes a rack, or a subrack experiment(s) or groupings of payload related items manifested separate from the rack.

C. Description of Transport Requirements - A description of the special requirements, if any, for the transportation of the payload hardware from ISS to landing (e.g., landing orientation, temperature, late on-orbit requirements, special handling, whether the MDL cooling configuration is front or rear cooled, mounting).

D. Description of Transfer Requirements - A description of the special requirements, if any, for transferring the payload hardware from the ISS to the Orbiter.

TABLE 6.2.2-1 TRANSPORT AND TRANSFER REQUIREMENTS

Flight Number	Payload Item	Description of Transport Requirements	Description of Transfer Requirements

[Expand table as required to document additional content.]

6.2.3 FLIGHT CREW TIME REQUIREMENTS

The PD shall provide the following information in Table 6.2.3-1, Flight Crew Time Requirements:

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. Total Crew Time During Descent (Hours) - The total amount of crew time needed to perform activities in support of payload operations during this mission phase. The total time needed should include onboard training and overhead time (e.g., to access, set up, and tear down support equipment.)

C. Description of Flight Crew Requirements - A description of the crew activities to be performed in support of payload operations.

TABLE 6.2.3-1 FLIGHT CREW TIME REQUIREMENTS

Flight Number	Total Crew Time During Descent (Hours)	Description of Flight Crew Requirements

[Expand table as required to document additional content.]

6.3 PROGRAM FURNISHED EQUIPMENT

This section of the PIA Increment Addendum documents the flight-by-flight PD's requirements for PFE to support ground and flight activities within Increment {Increment number}. The ISS Program will review, provide, approve, and fabricate all decals.

6.3.1 GROUND REQUIREMENTS

The PD shall provide the following information in Table 6.3.1-1, Program Furnished Equipment Ground Requirements:

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. Location - The location where the PFE is to be provided (e.g., KSC, PD site).

C. Equipment - List the PFE ground hardware required by the PD for use (e.g., Rack Handling Adapter, Rack Shipping Container, Suitcase Test Environment for Payloads, Payload Rack Checkout Unit). Hardware to be listed in this table includes ISS Fleet Resources and other ISS-provided hardware but does not include KSC-provided hardware and equipment to be used by the PD at KSC. KSC-provided hardware and equipment to be used at KSC shall be entered in the KSC Support Requirements Data Set.

D. Need Date - The date by which the equipment is needed.

E. Duration - The length of time relative to landing that equipment is needed.

TABLE 6.3.1-1 PROGRAM FURNISHED EQUIPMENT GROUND REQUIREMENTS

Flight Number	Location	Equipment	Need Date	Duration

[Expand table as required to document additional content.]

6.3.2 FLIGHT REQUIREMENTS

The PD shall provide the following information in Table 6.3.2-1, Program Furnished Equipment Flight Requirements. This includes any PFE required to support the flight de-integration and support operations required to be performed on the Shuttle.

A. Flight Number - The requested flight identification number (e.g., UF-6, 7-PROG).

B. Location - The location where the PFE is to be provided (e.g., KSC, PD site, etc.).

C. Equipment - The PFE flight hardware to be used by the PD, including carrier requirements (e.g., MDL, SSP Payload Mounting Panel, ISIS Stowage Drawer, PGSC, SSP Power Cable).

D. Need Date - The date by which the equipment is needed.

E. Duration - The length of time relative to landing that the equipment is needed.

TABLE 6.3.2-1 PROGRAM FURNISHED EQUIPMENT FLIGHT REQUIREMENTS

Flight Number	Location	Equipment	Need Date	Duration

NOTE: List only one item per line.

[Expand table as required to document additional content.]

7.0 PAYLOAD DEVELOPER-PROVIDED GROUND SUPPORT PERSONNEL AND CREW TRAINING REQUIREMENTS

This section describes the top-level training requirements for the Ground Support Personnel (GSP) involved with the payload. This section documents the training requirements that the PD will provide. GSP requirements will be documented in SSP 52000-PDS.

The PD will describe these training requirements in the subsequent tables and provide the flights affected, the trainees involved, and the training location. Detailed training requirements will be further documented in the Payload Training Data Set.

This section does not include requirements for training that will be provided to the PD by the Payload Operations Integration Function (POIF). These requirements will be determined by the Training Strategy Team (TST).

7.1 GROUND SUPPORT PERSONNEL AND CREW TRAINING REQUIREMENTS

The PD shall provide the following information in Table 7.1-1, Payload Developer-Provided Crew Training Requirements:

A. Flight Number - The first flight or the flight increments affected by the training requirement (e.g., UF-1, 7A).

B. Trainee Classification - The individual(s) requiring training in support of the payload operations, chosen from the following list:

   1. Launch/Landing Site GSP - loading/unloading operations; special ground processing.

   2. Telescience Support Center (TSC) Personnel - ground control and monitoring of individual payload.

   3. Crew Instructors - provide training to crewmembers.

   4. ISS Crew/SSP Crew.

   5. Other - other ground support personnel.

C. Training Hours - Estimate of number of hours required for this training.

D. Training Location - The location where the training is to occur. This will include on-board training from the crew when applicable. *If training is to occur at a site other than JSC, or onboard, a rationale must be supplied here and a waiver obtained from the Payload Training Panel.

TABLE 7.1-1 PAYLOAD DEVELOPER-PROVIDED CREW TRAINING REQUIREMENTS

Flight Number	Trainee Classification	Training Hours	Training Location*

[Expand table as required to document additional content.]

8.0 GROUND DATA SERVICES REQUIREMENTS DURING FLIGHT OPERATIONS

This section documents the top-level ground data services support requirements per increment. These requirements refer to the ground support requirements needed during simulations and real-time on-orbit operations at a payload's ground operating location. These include payload-unique services required if in the United States Operations Center (USOC), a TSC, or at any other operating location (e.g., network and/or hardware connectivity requirements). This section does not include requirements for KSC support. Details of these ground support requirements will be documented in the Ground Data Services Data Set. In case of any variation between the Data Set and the PIA Increment Addendum, the PIA Increment Addendum shall take precedence.

The respective user manuals will define all standard services available to PDs for the following locations. If your team plans to operate from one of these locations or any other NASA facility, a representative of that facility must be included in the assessment of these requirements.

A. Ames Research Center (ARC) TSC, ARC-BRP-40086, User Operations Facility Capabilities Document

B. Glenn Research Center (GRC) TSC, TSC-DOC-006, GRC Telescience Support Center User Guide

C. JSC TSC, LS-70053-2, JSC Telescience Support Center Capabilities Document

D. Marshall Space Flight Center (MSFC) TSC, TSC-HDBK-001, MSFC Telescience Support Center Capabilities Document

E. USOC, SSP 50304, POIC Capabilities Document

Requests for non-standard services must be assessed for cost and schedule impacts prior to approval. Any costs for non-standard services shall be the exclusive responsibility of the PD. The PD shall identify in the subsequent tables such ground requirements requested from the ISS Program.

8.1 PAYLOAD DEVELOPER-REQUESTED GROUND DATA SERVICES REQUIREMENTS DURING FLIGHT OPERATIONS

Significant premission planning and coordination is necessary to define the requirements for ground support. The PD shall provide the following information in Table 8.1-1, Ground Data Services Requirements During Flight Operations:

A. Ground Data Services Requirement - Choose from the following types of services. Select multiple services as required for each operating location.

    1. Experiment science/engineering data - any data used to support science and/or engineering support objectives such as Payload Multiplexer/Demultiplexer

(MDM) Health and Status, Payload Ancillary, Broadcast Ancillary, or Ground Ancillary data.

2. Voice - includes voice loops for ground-to-ground and ground-to-space communications in support of Earth-to-Orbit Vehicle (ETOV) and on-orbit ISS operations.

3. ISS Downlink Video

4. Ground commanding - Ability to issue an uplink command to a payload.

5. Payload Operations Integration Center (POIC) services - Reference SSP 50304 for a description of standard POIC-provided services and interface methods.

B. Location From - Indicate the source location (e.g., POIC, ISS, a TSC) of the ground support requirement.

C. Location To - Indicate the destination location (e.g., USOC, a TSC, other operating location) of the ground support requirement for each operating location.

D. Data Rate - Indicate the approximate total data rate of all payload-generated data streams in kbps between these locations. Data rate should be calculated by multiplying the number of Consultative Committee for Space Data Systems (CCSDS) Packets output per second (on a per-stream basis) by the maximum size of the generated CCSDS Packets.

E. POIC Process Data - Indicate a request for the POIC to process your experiment's science/engineering data. This request must be assessed prior to approval. (yes/no)

F. Voice Requirement - For voice requirement, provide the following information.

1. Voice Distribution System - Indicate if each operating location has a voice distribution system. (yes/no)

2. Internet Voice Distribution System (IVoDS) - For each operating location that does not have a voice distribution system, indicate the number of IVoDS interfaces required.

G. Operating Location Point of Contact - Provide the name and telephone number of the operating location point of contact responsible for configuring ground support hardware for interfacing to external services such as POIC Services and network communications services. Contact the facility manager to obtain this information. If there are multiple requirements for an operating location, the point of contact information only needs be entered once for each location.

H. ETOV Support - Will this operating location support ETOV operations? (yes/no)

TABLE 8.1-1 GROUND DATA SERVICES REQUIREMENTS DURING FLIGHT OPERATIONS

Ground Data Services Requirement	Location From	Location To	Data Rate (kbps)	POIC Process Data	Voice Distribution System	Internet Voice Distribution System	Operating Location Point of Contact	ETOV Support
Experiment Sci/Eng Data				Y or N				Y or N
Voice					Y or N			Y or N
ISS Downlink Video								
Ground Commanding								Y or N
POIC Services								Y or N

[Expand table as required to document additional content.]

8.2 ADDITIONAL REQUIREMENTS/SERVICES DURING FLIGHT OPERATIONS

The PD shall identify any additional requirements/services (e.g., Program- or facility-provided Telescience Resource Kit (TreK) workstation, ISS payload requirement for Shuttle services if not already identified in Table 8.1-1) for an operating location in Table 8.2-1, Additional Requirements/Services During Flight Operations. These additional requirements must be assessed for cost and schedule impacts prior to approval.

TABLE 8.2-1 ADDITIONAL REQUIREMENTS/SERVICES DURING FLIGHT OPERATIONS

APPENDIX A

ACRONYMS AND ABBREVIATIONS

APPENDIX A - ACRONYMS AND ABBREVIATIONS

°C	degree Celsius
µg	microgravity
A	Amp
ARC	Ames Research Center
ASC	Aisle Stowage Container
CCSDS	Consultative Committee for Space Data Systems
CE	Cargo Element
CM	Configuration Management
DFRC	Dryden Flight Research Center
DQA	Document Quality Assurance
EAR	Export Administration Regulations
ECLS	Environmental Control and Life Support
EEOM	Early End of Mission
Eng	Engineering
EOM	End of Mission
ETOV	Earth-to-Orbit Vehicle
ETR	EXPRESS Transportation Rack
EVA	Extravehicular Activity
EVR	Extravehicular Robotics
EXPRESS	EXpedite the PRocessing of Experiments to the Space Station
GFE	Government Furnished Equipment
GRC	Glenn Research Center
GSP	Ground Support Personnel
Hg	Mercury
HP	Hewlett Packard
hr	hour
HRFM	High-Rate Frame Multiplexer
Hz	Hertz
ICD	Interface Control Document
ID	Identification
ISIS	International Subrack Interface Standard
ISPR	International Standard Payload Rack
ISS	International Space Station
IVA	Intravehicular Activity
IVoDS	Internet Voice Distribution System
JSC	Johnson Space Center
kbps	kilobits per second
kg	kilogram

KSC	Kennedy Space Center
kW	kiloWatt
L-	Launch minus
LCC	Launch Commit Criteria
LSE	Laboratory Support Equipment
LTL	Low Temperature Loop
m^3	cubic meter
Mbps	Megabits per second
MELFI	Minus Eighty Degree Laboratory Freezer for ISS
MDK	Middeck
MDL	Middeck Locker
MDM	Multiplexer/Demultiplexer
mm	millimeter
MPLM	Multi-Purpose Logistics Module
MSFC	Marshall Space Flight Center
MTL	Moderate Temperature Loop
N/A	Not Applicable
NASA	National Aeronautics and Space Administration
OMS	Orbital Maneuvering System
PALS	Program Automated Library System
PCB	Payloads Control Board
PCS	Portable Computer System
PD	Payload Developer
PFE	Program Furnished Equipment
PGSC	Payload General Support Computer
PIA	Payload Integration Agreement
PILS	Payload Integration Library System
PIM	Payload Integration Manager
P/L	Payload
PLBD	Payload Bay Door
POIC	Payload Operations Integration Center
POIF	Payload Operations Integration Function
ppm	parts per million
PTCS	Payload Test and Checkout System
R+	Return plus
RPO	Research Program Office
RSP	Resupply Stowage Platform
RSR	Resupply Stowage Rack
Sci	Science
SRB	Solid Rocket Booster
SSE	Station Support Equipment

SSP	Space Shuttle Program
SSPF	Space Station Processing Facility
T-	Time prior to launch minus
TBD	To Be Determined
TBR	To Be Resolved
TReK	Telescience Resource Kit
TSC	Telescience Support Center
TST	Training Strategy Team
UIP	Utility Interface Panel
UOP	Utility Outlet Panel
USOC	United States Operations Center
V	Volt
VBS	Video Baseband Signal
WORF	Window Observational Research Facility

APPENDIX B

GLOSSARY OF TERMS
<RESERVED>

APPENDIX B - GLOSSARY OF TERMS <RESERVED>

APPENDIX C

OPEN WORK

APPENDIX C - OPEN WORK

Table C-1 lists the specific To Be Determined (TBD) items in the document that are not yet known. The TBD is inserted as a placeholder wherever the required data is needed and is formatted in bold type within brackets. The TBD item is numbered based on the section where the first occurrence of the item is located as the first digit and a consecutive number as the second digit (i.e., **<TBD 4-1>** is the first undetermined item assigned in Section 4 of the document). As each TBD is solved, the updated text is inserted in each place that the TBD appears in the document and the item is removed from this table. As new TBD items are assigned, they will be added to this list in accordance with the above described numbering scheme. Original TBDs will not be renumbered.

TABLE C-1 TO BE DETERMINED ITEMS

TBD	Section	Description

Table C-2 lists the specific To Be Resolved (TBR) issues in the document that are not yet known. The TBR is inserted as a placeholder wherever the required data is needed and is formatted in bold type within brackets. The TBR issue is numbered based on the section where the first occurrence of the issue is located as the first digit and a consecutive number as the second digit (i.e., **<TBR 4-1>** is the first unresolved issue assigned in Section 4 of the document). As each TBR is resolved, the updated text is inserted in each place that the TBR appears in the document and the issue is removed from this table. As new TBR issues are assigned, they will be added to this list in accordance with the above described numbering scheme. Original TBRs will not be renumbered.

TABLE C-2 TO BE RESOLVED ISSUES

TBR	Section	Description